Aspectual Verbs in Japanese

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Abstract

This paper attempts to clarify semantic properties of some aspectual verbs in Japanese. We claim that basic character of aspectual verbs is that they affect the events described by embedded sentences and yield new events or states from them. This is our claim.

1 INTRODUCTION

The basic character of aspectual verbs in Japanese is that they affect events and yield new events or states from them. The overall organization of this paper is as follows: in section two, we will introduce the notion of events and states into our ontology and present a model. In section three we will discuss semantic properties of some aspectual verbs and their truth conditions. Section four is our conclusion.

2 EVENTS AND STATES

2.1 CHARACTERIZATIONS OF EVENTS AND STATES

Following Galton [1], we introduce the notion of events and states into our ontology. Galton argues that while events involve change of state, states are essentially unchangeing. It should be noticed that Galton claims that the situations described by a English progressive sentence is included in his state. Hereafter, we use the term *state* or *event*, in Galton's sense.

According to Galton, the evaluation of (1a,b), state-describing sen- tences, one point of time is enough, but the evaluation of (2), an event- describing sentence, needs an interval which contains some points of time. According to Galton, this difference between event-describing sentences and state-describing sentences comes from whether they involve change of state or not.

(1)a. *He is running.*
b. *He is dead.*

(2). *He runs.*

Galton argues that although what the subject denotes in the state described by (3) is changing with respect to its position, the state itself is not changing.

(3). *It is moving.*

2.2 THE INTERNAL STRUCTURE OF EVENTS

We claim that every event can be viwed as a gestalt which consists of two or three states. Here, we use the term *gestalt* in Lakoff's [2] sense. According to Lakoff, *gestalt* is a whole that we human beings find more basic than the parts.
According to Galton, every event contains at least two states — a state which obtains before the change and a state which obtains after the change. Henceforth, we call these two states an initial state and a final state, respectively. Some events contain a state of change, in addition to these two states.
In this respect, we distinguish two classes of events. One is those events which contain a state of change, in between an initial state and a final state, and the other is those events which do not contain a state of change. See (4).

(4)a.	initial state	state of change	final state
b.	initial state	final state	

An example of events that might be classified as (4a) is the event described by (5). According to Galton, we cannot draw a clear line between the bananas that have ripened and the bananas that have not ripened yet, and consequently, the event described by (5) is perceived to contain a gradual change. This gradual change corresponds to a state of change in our framework.

(5). *A banana ripens.*

An example of events that might be classified as (4b) is the event described by (6). In (6), the change is recognized by the observation of the difference between the initial state and the final state.

(6). *The car starts moving.*

We examine how Vendler's [3] classification of verbs can be considered in our framework. Vendler claims that verbs can be classified into four groups listed in (7). Although Vendler himself said that this is a classification of verbs, we regard these classes as those of situations.

Examples of these classes are shown in (8) below. (8a-d) correspond to (7a-d), respectively.

We consider that (7a) is contained in state in Galton's sense, (7b) corresponds to (4a), and both (7c) and (7d) are contained in (4b). At first sight, it might be odd to suppose that (7c) is contained in (4b), but it is right. We think that the difference between (7c) and (7d) is that while the final states of those events which are classified as (7d) represent a static situation, the final state of those events which are classified as (7c) represent some kinds of motion. For example, the event described by (8c) will be considered to consist of the initial state where the object denoted by *he* is not in running activity and the the final state where *he* is in running activity.

(7)a. state
b. accomplishment
c. activity
d. achievement

(8)a. *He was dead.*
b. *He made a chair.*
c. *He ran.*
d. *He reached to the top of the mountain.*

According to Vendler, while the progressive form of activity verbs entail their non-progressive counterparts, the progressive form of accomplishment verbs do not have such an entailment. For example, while (9a) entails (8c), (9b) does not entail (8b).

We consider here that (9a) describes a final state and (9b) describes a state of change, respectively. Therefore, it is quite natural for (9a) to entail (8c), because the state described by (9a) can be assumed to obtain after the event described by (8c) has occurred. On the other hand, (9b) does not entail (8b), because the state described by (9b) is not perceived as obtaining after the event described by (8b) has occurred.

(9)a. *He was running.*
b. *He was making a chair.*

3 FORMAL THEORY

In this subsection, we present a model which reflects the considerations above. We difine the model M as a tupile $\langle U, S, E, \langle I, < \rangle, W, R, \{0,1\}, g, \Delta, \Xi \rangle$

- U is a set of individuals. $S = \{s, s', ...\}$ is a set of *states* and $E = \{e, e', ...\}$ is a set of *events*. Lattice theoretic operations defined in Link [4, 5] are applied to the elements of these sets. We call the subsets of S as *state type* and use ψ, ψ', ψ'' , and so on to represent them. And we mention to the subsets of E as *event type* and use ϕ, ϕ', ϕ'', and so on to represent them.

- $I = \{i, i', ...\}$ is a set of *intervals*. It should be noticed that intervals are sets of time. Moments can be seen as singleton sets. ' $<$ ' is a precedence relation on I.

- $W = \{w, w', ...\}$ is a set of possible worlds.

- $R = \{Agent, Theme, etc.\}$is a set of theta roles. Theta roles are functions from $S \cup E$ to U. For further detail, see [6].

- $\{0,1\}$ is a set of truth values. 'g' is an assignment function from $(S \cup E) \times I \times W$ to $\{0,1\}$.

- $\Delta = \{\delta_i, \delta_f, \delta_c\}$ is a set of functions from E to S. δ_i assigns an event to its initial state. δ_f assigns an event to its final state. δ_c assigns an event to its state of change, if the said event has a state of change as its part.

- $\Xi = \{\xi_i, \xi_f, \xi_c\}$ is a set of functions from pow(E) to pow(S). ξ_i assigns an event type to a set of states which share sufficiently many properties with the initial states of all the events which belong to a given event type. ξ_f and ξ_c are characterized in the same way.

We further define some related matters as below.

Definition 1 *1.*$\psi \subseteq S$ *obtains at* $i \in I$ *in* $w \in W \leftrightarrow \exists s[s \in \psi \wedge g(< s, i, w >) = 1]$
2.$\phi \subseteq E$ *occurs at* $i \in I$ *in* $w \in W \leftrightarrow \exists e[e \in \psi \wedge g(< e, i, w >) = 1]$

4 SEMANTIC PROPERTIES OF SOME ASPECTUAL VERBS IN JAPANESE

4.1 *-teiru*

We claim that *-teiru* is an operator which changes event-describing sentences into state-describing sentences. We define the truth conditions for *-teiru* sentence as below.

Definition 2 (Truth conditions for *-teiru* sentence) *TEIRU(*ϕ*) obtains at* i *in* $w \leftrightarrow \xi_f(\phi)$ *obtains at* i *in* $w \vee \exists \phi'[\phi' \subseteq \phi \wedge \xi_c(\phi')$ *obtains at* i *in* w]

In the definition above, TEIRU(ϕ) is the semantic object corresponding to the tenseless form of *-teiru* sentence and 'ϕ' is the semantic object corresponding to the sentence embedded in *-teiru* sentence. For example, in (10) below, (10a) is a tensed form of a *-teiru* sentence and (10b) is a tenseless form. And (10c) can be viewed as the sentence embedded in (10a) or (10b).

(10)a. *John-ga* *ohiru wo* *tabe-tei-ru.*
John-NOM lunch-ACC eat- -PRESENT
John is eating a lunch.
b. *John-ga* *ohiru-wo* *tabe-tei-*
c. *John-ga* *ohiru-wo* *tabe-*

In light of this definition, the interpretation of a *-teiru* sentence might be either a state of change or a final state depending on the given context. We consider that Yoshikawa's [7] well known classification of the meanings of *-teiru* sentence is actually a classification for the interpretations of *-teiru* sentences. Yoshikawa classified the interpretations of *-teiru* sentences as in (11).

(11)a. dōsa-no kēzoku 'continuation'
b. kekka-no jōtai 'result state'
c. tannaru jōtai 'mere state'
d. kurikaesi 'iteration'
e. keiken 'experience'

Examples of these classes are shown in (12) below. (12a,b) correspond to (11a). And (12c-f) correspond to (11b-e), respectively[1].

(12)a. *John-ga* *hasit-tei-ru.*
John-NOM run- -PRESENT
John is running.
b. *John-ga* *isu-wo* *tsukut-tei-ru.*
John-NOM chair-ACC make- -PRESENT
John is making a chair.
c. *Sono hito-wa* *sin-dei-ru.*
that man-TOP die- -PRESENT
The man is dead.
d. *Michi-ga* *magat-tei-ru.*
road-NOM wind- -PRESENT
The road is winding.
e. *Kare-wa* *mainichi* *hasit-tei-ru.*
he-TOP everyday run- -PRESENT
He is running everyday.
f. *Watashi-wa* *mō* *sore-wo*
yon-dei-ru.
I-TOP already that-ACC
read- -PRESENT
I have already read that one.

The reason why only (11a) has two examples in (12) is that we consider that (15a) has two subclasses. One corresponds to a state of change, and the other corresponds to a final state. We think that (12a) is used to describe a final state and (12b) is usded to describe a state of change in normal settings. As we discussed in 2.2, we admit a final state which is characterized by the motion of something and we think that (12a) is used to describe such a state. The states which can be described by (12c,f) correspond to a final state of an event. (12d) is also used to describe a final state of an event, but the states which can be described by (12d) do not have a corresponding event which can occur in the real world, because roads cannotbe bent. In 3, we stipulated ξ_f as a function which assignsan event type to a set of states which share sufficiently many properties with the final states of all the events which belong to a given event type. Therefore, (12d) does not have to have a corresponding event which occurs in the real world.

Let us now discuss how we can solve the imperfective paradox. Dowty [8] states that although the progressive form of the accomplishment sentences entails that someone is engaged in a certain activity, it does not entail that he completes the activity. For example, in (13), although this sentence entails that Max was engaged in a crossing-the-street activity, it does not entail that he reached to the goal of the crossing activity — a sidewalk, and so on. (13) can be a true statement even if he interrupted by something and cannot complete his crossing activity.

(13). *Max-ga* *dōro-wo* *ōdan-si-tei-ta.*
Max-NOM street-ACC crossing-do- -PAST
Max is crossing the street.

According to Dowty, (13) is true if and only if Max completes his crossing activity in a world which is exactly like the given world up to the time in question and in which the future course of events after this time develops in ways most compatible with the past course of events. However, as is discussed in Vlach [9], it is hard to characterize such a world. Vlach says that when Max is crossing the street, but unknown to him, a bus traveling at thirty miles per hour is an inch away from hitting Max, the most natural course of event would be that Max is hit by bus and he will never cross the street. However, (13) might be a true statement describing the situation.

We can solve this problem by assuming that not only the range of ξ_f, but also that of ξ_c contain states which are not in the range of δ_c not regarded as the state of change of any events in E, the set of events in a given model, as long as they share sufficiently many properties with the states in the range of δ_c. Then, even when it is impossible for Max to complete his crossing activity, (13) can be a true statement, if the state which is very similar to the states of change of Max's crossing event which can occur in a certain world.

The analysis of (12e) needs some considerations. We think that (12e) is used to describe a state which corresponds to a state of change of a complex event. Following [5, 10], we admit complex events which made from some simple events by a lattice theoretic operation. It should be noticed that such a complex event is also an individual event. (12e) represents a state type whose members are such complex events whose occurrences are accomplished by the occurrences of

every subevent of them. We think that in (12e), the scope of *mainichi* does not range over the whole sentence, but the embedded sentence. *mainichi* requires that subevents of a complex event to continuously occur at least once per a day in a contextually determined period. (12e) is used to describe the state of change of such a complex event. This state of change is characterized by a continuous occurrence of its subevents. Although the situation described by (12e) consists of many occurrences of subevents, the situation itself is not changing with respect that running events countinuously occurring througout this situation. It is worth mentioning here that as Vendler points out in [3], generic sentences like (14) describe a kind of state — generic state in Vendler's term.

(14). *The sun rises in the east.*

This observation may suggest that continuous occurrences of events can be regarded as a state. (12e) is perceived to be a true statement, if the individual denoted by *kare* continuously runs at least once in a day during a certain period which lasts sufficiently long.

4.2 *-tearu*

We characterize the meaning of *-tearu* as an operator which works on the event type described by an embedded sentence and yield a state type in the domain of $\xi_f(\phi)$. We define the truth conditions for *-tearu* sentence as below.

Definition 3 (Truth conditions for *-tearu* sentence) *TEARU(ϕ) obtains at i in w* $\leftrightarrow \exists s[s \in \xi_f(\phi) \wedge \exists \phi'[\phi' \subseteq E \wedge (\phi' \neq \phi) \wedge s \in \xi_i(\phi')] \wedge g(< s, w, i >) = 1]$ *Here, ϕ should be included in the domain of Agent* $\in R$

Here, 'ϕ' and "embedded sentence" are characterized in the same way as in 4.1. TEARU(ϕ) is a semantic object corresponding to a *-tearu* sentence.

Syntactically, there are two types of *-tearu* sentence. One is those sentences whose subcategorization feature of the main verb is due to changeand with respect to the cooccurrence restriction, and whose object of the main verb corresponds to the surface subject, and whose subject of the main verb does not appear in the surface sentence. In (15), (15a) is a *-tearu* sentence and (15b) is a corresponding *non-tearu* sentence which has the same main verb as (15a).

(15)a. *Mado-ga* *ake-tear-u.*
window-NOM open- -PRESENT
The window has been opened.

b. *dareka-ga* *mado-wo* *ake-ru.*
someone-NOM window-ACC open-PRESENT
Someone opens the door.

The other is those sentences whose subcategorization of their main verbs does not change. The main verbs of these sentences may be either transitive or intransitive.

(16)a. *Watashi-wa* *sono hanashi-wo* *minna-ni* *si-tear-u.*
I-TOP that story-ACC everyone-DAT do- -PRESENT
I have told that story to everyone.
b. *Watashi-wa* *sono hanashi-wo* *minna-ni* *su-ru.*
I tell that story to everyone.

Although *-tearu* in (15a) and (16a) is different in its syntactic behaviors, *-tearu* in both (15a) and (16a) are basically the same with respect to semantics. It means that while an NP which carries an agent role does not appear in the surface form of (15a), (15a) implies that the state described by it caused by someone's intentional activity.

(17) is unacceptable because *sono hito* in (17) is not regarded as an agent and it does not have an agent. Compare (17) with (12c), a *-teiru* sentence. The fact that (12c) is acceptable suggests that *-teiru* sentence does not carry such a restriction.

(17). **Sono hito-wa* *shin-dear-u.*

As is pointed out in Ogihara [11], *-tearu* sentences imply that the agent is ready for something forthcoming. This means that the state described by *-tearu* can be onsidered to correspond to the initial state of an event. Ogihara illustrates this implication by the examples in (18)[2].

Ogihara says that (18a) can be translated as *I have the expereience of reading the book..* and (18b) can be rendered as *'I have read the book and, therefore, I am ready (prepare) for something forthcoming..*

(18)a. *Watashi-wa* *kono hon-wo* *yon-dei-ru.*
I-TOP this book-ACC read- -PRESENT
b. *Watashi-wa* *kono hon-wo* *yon-dear-u.*

4.3 *-hajimeru*

While *-teiru* sentence or *-tearu* sentence describes a state, *-hajimeru* sentence describes an event. *-hajimeru* applies to the semantic object described by an embedding sentence and yields a new event-describing sentence. Although it has been claimed in the literature (e.g. [12]) that *-hajimeru* sentence means the beginning of an activity, we think it is not suffice. We argue that there are two classes of *-hajimeru* sentences. One is those sentences which describe the beginning of the state of change of an event — the biginning of activity is included in this type, and the other is those sentences which describe the beginning of a generic state. We difine the truth conditions for *-hajimeru* sentence as below.

Definition 4 (Truth conditions for *-hajimeru* sentence) *1. If the embedding sentence denotes an event type, HAJIMERU(ϕ) occurs at i in w* $\leftrightarrow$ $\exists\phi'[\phi' \subseteq \phi \wedge \xi_i(\phi')$ *obtains at i' *$\wedge \xi_c(\phi')$ *obtains at i"] where* $i', i'' \subseteq i, i' < i''$ *and* $\neg\exists i'''[i''' \subseteq i \wedge \xi_i(\phi')$ *nor* $\xi_c(\phi')$ *obtains at i"]*
2. If the embedded sentence is a generic sentence, HAJIMERU(ψ) obtains at i $\leftrightarrow$ *ψ does not obtain at i' *$\wedge\psi$ *obtains at I" where* $i', i'' \subseteq i, i' < i''$ *and* $\neg\exists i'''[i''' \subseteq i \wedge i''' \subseteq [\neg i' \vee \neg i'']]$

Examples of *-hajimeru* sentence whose embedded sentences describe an event type are (19) below. (19a) is used to describe an event where the person denoted by *watashi* does not in making a chair activity at an interval i and in making a chair activity at some later interval i'. (19b) is used to describe an event where no children are dead at an interval i and some of them are dead at some later interval i'. It should be noticed that in (19b), the event type described by the embedded sentence is a plural event in Link's sense and yield by a lattice theoritic operation from some individual events.

(19)a.	*Watashi-wa*	*isu-wo*	*tsukur-i-hajime-ru.*
	I-TOP	chair-ACC	make-GER- -PRESENT
	I begin to make a chair.		
b.	*Kodomo-tachi-ga*	*shin-i-hajime-ta.*	
	child-PL-NOM	die-GER- -PAST	
	Children began to die.		

An example of *-hajimeru* sentences whose embedded sentence represents a generic state is (20) below. (20) is used to describe an event where the smoking habit of the person denoted by *watashi* began when he was fifteen years old.

(20).	*Watashi-wa*	*jūgo-no toki*	*tabako-wo*	*su-i-hajime-ta.*
	I-TOP	fifteen-GEN when	tabaco-ACC	smoke-GER- -PAST
	I began to smoke when I was fifteen.			

5 CONCLUSION

In this paper, attempts are made to clarify semantic properties of some Japanese aspectual verbs in Japanese. Although our discussion in this paper is only for three of them — *-teiru*, *-tearu* and *-hajimeru* — we believe that the meaning of the other aspectual verbs will also become clearer in the framework of this paper.

Notes

I wish to thank Akira Ikeya and participants of the conference for their comments on an earier version of this paper. All errors are mine.
1 In (12c,f), the first phoneme of /tei/ is voiced and as a result, /tei/ become /dei/.
2 (18a) also can be interpreted as describing an activity. We ignore this possibility here.

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